

Banner Engineering's QT50 radar sensor detects the hall roof from the roof of the cab



## Air Traffic Control

**Linde Material Handling offers a system for its fork lift trucks that automatically reduces the maximum speed in indoor areas as soon as the QT50 radar sensor from Banner Engineering detects a hall roof above the fork lift truck.**

On public roads it's the relevant national traffic regulations that set the limits for road users. Behind factory gates, however, it's the health and safety regulations of the company itself that specify the driving code. The company also sets the maximum speed on corporate premises. However, like many car drivers, some fork lift truck drivers incorrectly estimate the risks arising from their driving style.

Excess speeds are just as much an accident risk in fork lift truck traffic as in road traffic. This is particularly the case in production halls and warehouses, since the vehicles are frequently operating in restricted conditions with many employees moving around at the same time. These are then seen too late, since vision is often impaired by machinery or shelves, walls or columns. Fork lift truck development is thus faced with

the challenge of optimally combining the requirements of safety and economy.

#### Manual switching of maximum speed unsatisfactory

A manufacturer of fork lift trucks that is focusing on this task is Linde Material Handling GmbH, a company belonging to the KION Group. Linde Material Handling is one of the world's leading manufacturers of fork lift trucks and storage technology devices and market leaders in Europe. Linde has been pursuing the issue of a reasonable speed for fork lift truck as an important safety feature for quite some time. Although a general speed reduction would easily be possible, "customers don't want to have their handling capacity reduced by a general speed reduction," explains Jennifer Skarabisch, who is responsible for electrical engineering in the fork lift and industrial truck department at Linde Material Handling: One initial solution enabled the manual two-stage switching of the maximum speed. The drivers had to switch to a lower maximum speed in indoor areas, which is normally around 6 km/h. However, drivers were not as consistent in switching to a reduced speed in halls as the colleagues from the safety department required.

#### SpeedAssist: Safety with a high handling capacity

Many customers wanted a solution that did not depend on the individual decision of the driver. Jennifer Skarabisch and her colleague Michael Fuchs, product manager for Parts in the Customer Services department at Linde Material Handling, continued to pursue the issue and developed the SpeedAssist, which reduces the maximum speed in indoor areas automatically. "The automatic switching can meet both requirements for greater safety in the indoor area, geared to the actual plant environment, whilst ensuring optimum handling capacity outdoors at the same time," product manager Fuchs explains.



The automatic reduction of maximum speed in indoor areas saves the customer from having to make any changes to the existing infrastructure. The fork lift truck itself had to provide the solution. The obvious option was for the fork lift truck to detect the hall roof with a sensor.

#### QT50 radar sensor meets all criteria

"We looked at various sensor technologies from different manufacturers," Skarabisch describes the selection process. "In all cases we wanted a solution

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»The automatic switchover can connect both requirements of safety and high handling capacity.«

Michael Fuchs | Linde Material Handling

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## QUICK READ

With its SpeedAssist system, Linde Material Handling is helping its fork lift truck customers to increase the safety of transport on company premises. The Linde SpeedAssist detects whether the fork lift truck is in a hall, and in this case reduces the maximum speed to a predefined value that can be set in the vehicle controls. Indoor operation is detected as soon as the QT50 radar sensor from Banner Engineering detects a hall roof. The sensor from the Turck portfolio offers impressive performance thanks to its robust design and variable setting options. It can thus be set to the individual requirements of virtually any factory premises.

that already has proven use, in order to get to the market quickly. Optical sensors frequently had problems caused by the risk of contamination. Using the radar sensor has enabled us to achieve some reliable results." The criteria here included a large range, with compact dimensions and robust design, since the sensors are used outdoors and are occasionally subject to high vibrations including shocks. Our in-house testing for these criteria found a radar sensor from the Turck portfolio to have the best results: The QT50 radar sensor developed by Turck's partner Banner Engineering.

#### Hall roof detection up to a height of 24 meters

The sensor of the SpeedAssist is located at the back of the cab roof and detects hall rooves up to a height of 24 meters. It indicates to the controller via a switching

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Jennifer Skarabisch | Linde Material Handling



output whether a roof has been detected. The controller then gently slows down the driven speed or allows the higher maximum speed in the outdoor area. Linde initially launched the Speed Assist via its worldwide spares distribution network as a retrofit. However, as the system has been received so well, the SpeedAssist is now being introduced from the Aschaffenburg plant as an equipment option for all new vehicles.

**Individual adaption in the field**

Electrical engineer Skarabisch highlighted the sensor's ability to be adapted easily to the customer's requirements as one of the positive features: "Our customers' operating conditions vary greatly. It's good that the sensitivity, the range and the delay time can be set directly at the sensor. Together with their Linde service technician customers can adjust the system to the conditions at their particular location."

**Custom setting to field conditions possible**

For example at one customer, the delayed response of the sensor (up to 3 seconds) made it possible to ensure that fork lift trucks did not reduce speed in places where the vehicles passed under pipe bridges and trees. It is now possible to drive under the pipe bridges at a normal speed. The reduced speed can also be set with the support of a service technician – in the controller, however, and not in the sensor. "This customized setting feature definitely helped in securing customer acceptance of the system," adds product manager Fuchs. Despite the setting options, the system is also protected against manipulation by the driver. Once mounted the sensor does not allow any settings on the sensor to be changed. On vehicles with the Linde SpeedAssist, the controller is programmed so that the fork lift truck switches to the reduced speed if the sensor is separated from the cable.



The compact dimensions, robust design and flexibility were key factors in choosing Banner's QT50 as the SpeedAssist sensor, which was manufactured for Linde as a brand label product

Experts from Turck and Banner Engineering were always at hand to help the Linde developers in the search for the right settings. For example, a problem with accumulated condensation when setting the sensitivity of the sensor could be rectified. In spite of the dome-shaped design, water can sometimes collect on the sensor. This did not occur when it rained but when dew condensation accumulated overnight. "The meetings with the sensor experts enabled us to also gather experience, which we were able to pass on internally to our service network," Skarabisch says.

#### Positive customer feedback

Linde has been offering the SpeedAssist as a retrofit solution since July 2015. "Those who are already using the system are extremely positive about it," Fuchs states. Besides the SpeedAssist, Linde still has other safety features in its range. The so-called BlueSpot places importance on warning pedestrians in the plant. When reversing, a blue spot is projected on the ground at the back of the fork lift truck. Workers in the factory thus detect the fork lift truck already before they see it. The BlueSpot thus effectively helps to prevent accidents with quiet running electrically driven fork lift trucks or in noisy working environments.

#### Outlook

One challenge still has to be overcome: In the shipping industry the height of roofs of up to 70 meters exceeds the standards of other industrial buildings. The compact QT50 radar sensor does not detect these rooves. Developers at Banner Engineering are therefore already working on a radar sensor that also detects the highest halls. Safety for fork lift truck drivers and employees will thus in future be improved in all production and warehouse areas of this company.

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Youtube-Video SpeedAssist



Linde's SpeedAssist  
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